



## Audio Solutions for Media Files

MXF, LXF, GXF, QuickTime, WAV, AIFF



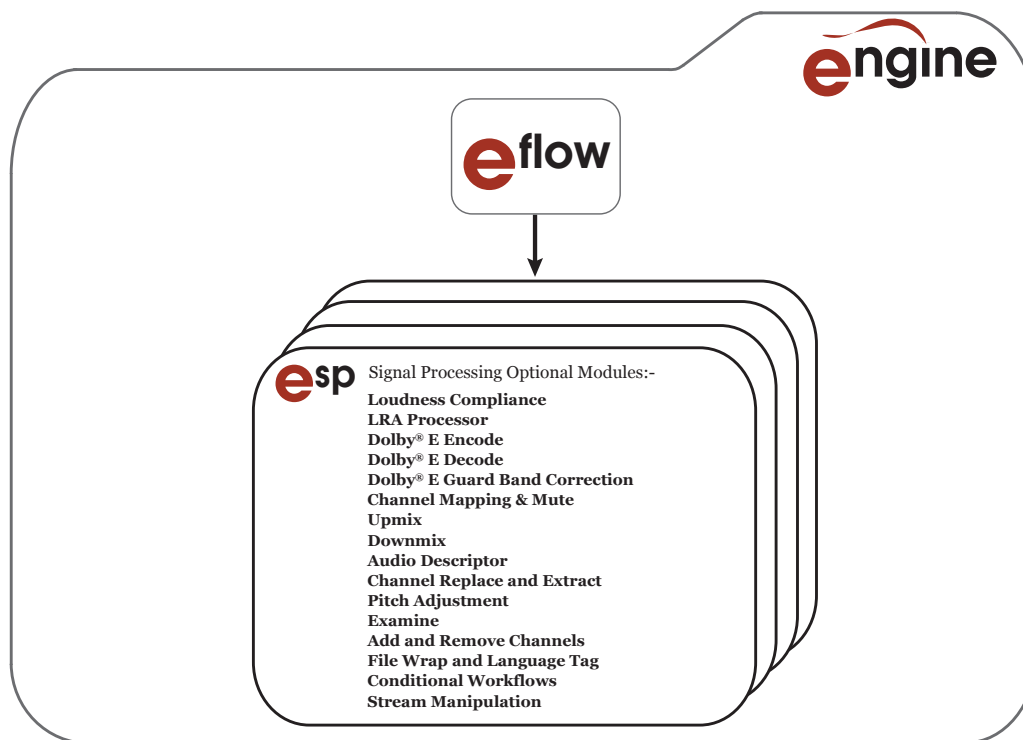
Engine saves you time and money by automating repetitive tasks commonly done in an edit suite: Loudness Processing, Dolby E transcoding, Stream Processing, File Wrapping, Audio Channel Add / Remove, Language Tagging, Pitch Correction, and almost any type of non-creative audio processing you can think of. The software is scalable and can grow as your business increases.

Engine has been used 24/7 by Broadcasters for several years, guaranteeing reliable and consistent operation. Engines flexible automation options let you control Engine from various API based tools including Telestream Vantage and Aspera Orchestrator, as well as from the included Watch Folder system, or our network client tool.

Engine includes an easy to use graphical workflow creation tool, needing minimal training to become an expert, keeping you fully in control. Processing management tools are also included for real time monitoring.

Comprehensive PDF, XML and CSV reporting facilities are part of the package, giving you access to all the information you need to keep your clients informed.

Engine is compatible with Windows, OSX and Linux, and supports virtual machine installation. A wide range of professional media file types are supported, including MXF, QT/MOV, WAV and AIFF, in all video resolutions from SD through to UHD.



Engine is a software application providing audio processing solutions for Media Files. Used in Post Production and in automated broadcast environments, it is a modular product that features:

- Easy to orchestrate complex audio processing workflows
- Easy to use visual workflow creation
- Built in job management system
- Scalable processing
- Manual, Watch Folder & API operation
- High quality audio processing
- Detailed PDF and XML reports

# Engine Architecture

Engine is a software application providing audio processing solutions for Media Files.

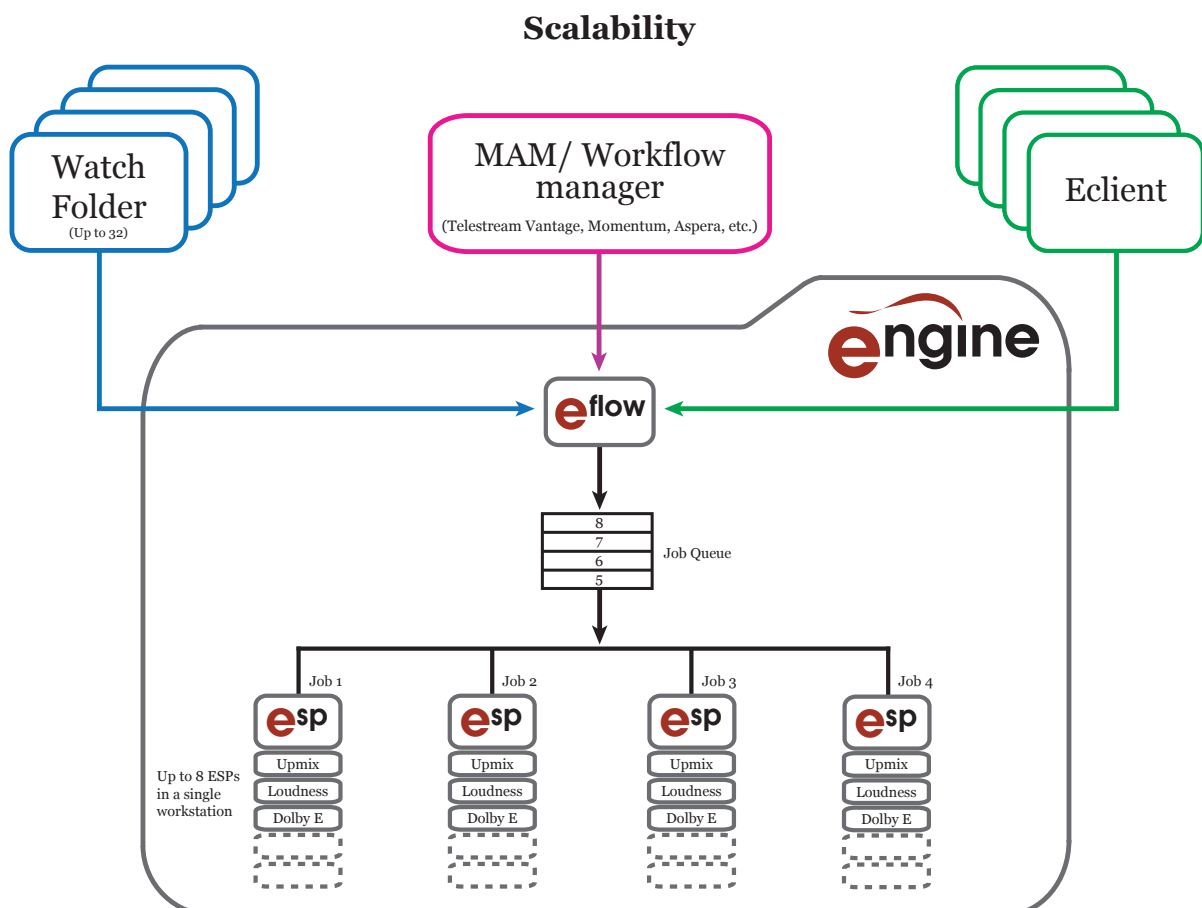
Eflow is the job management system of Engine. It registers posted jobs and adds them to a queue, assigning them to an ESP (Emotion Signal Processor) when one becomes available. Running as a service (on Windows) and a Daemon (on Mac and Linux) it is able to restart the Engine, restoring all job and workflow information and restarting the queue in the case of an application or server failure.

ESP is the Emotion Signal Processor application. It is the file processing system that executes a workflow, unwrapping audio from Media Files, applying a sequence of audio processes quickly and efficiently, then rewrapping into a Media File preserving the video and metadata content.

## Scalability

Engine has been designed to provide scalability in terms of control, breadth of signal processing and speed.

Up to eight ESPs can be allocated to a single Eflow allowing up to eight files to be processed simultaneously. ESP operates at a high speed and is a simple, scalable model that provides the ability to increase total throughput.

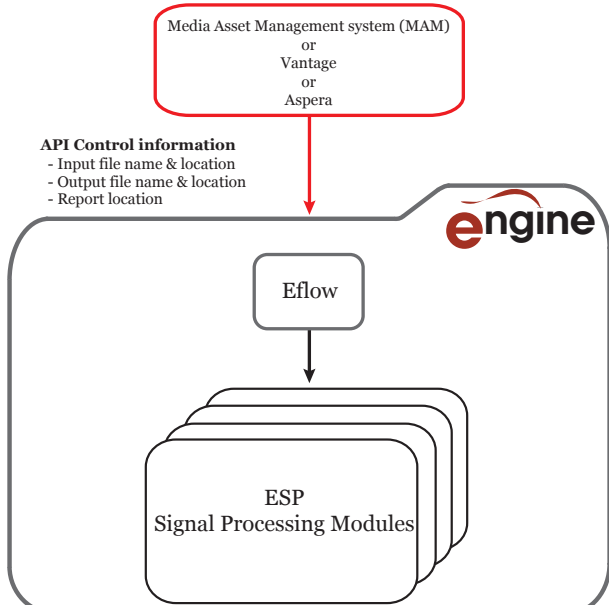


# Engine Control

Engine has four modes of operation:- API, Manual, Watch Folder, Eclient

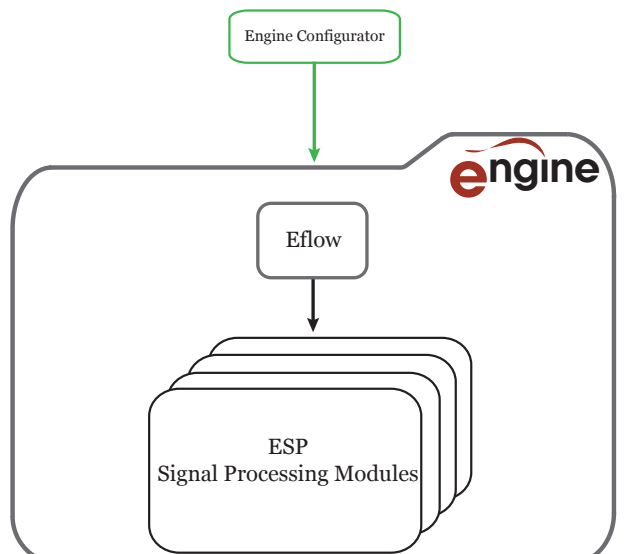
## API

Simple ReSTful XML-based interface.  
Commands to post jobs, view workflows  
and monitor status.



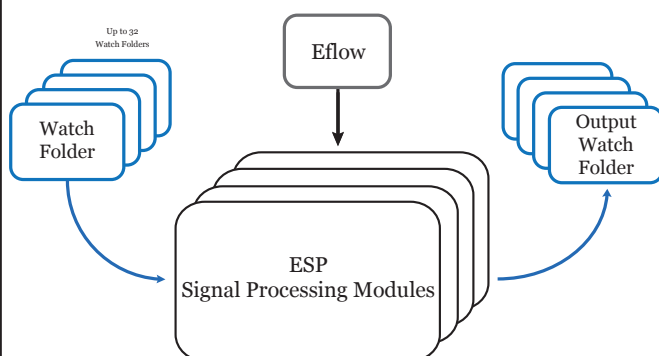
## Manual

Single file can be processed and a report generated.



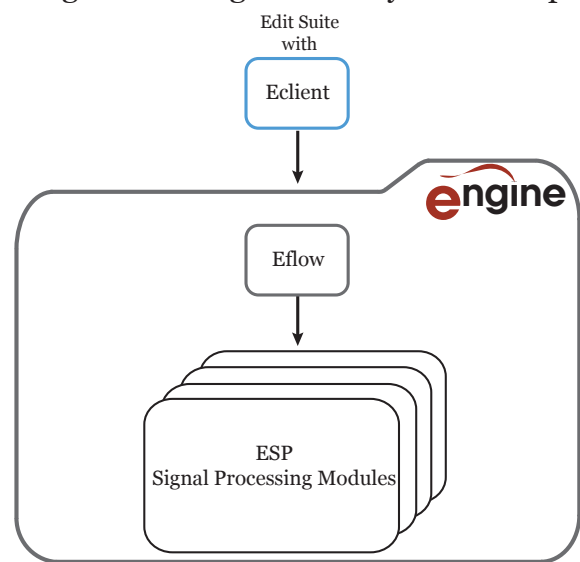
## Watch Folder

Simple Watch Folder mechanism whereby  
files can be dropped in folders and jobs will  
automatically be posted to Engine.  
Up to 32 folders can be configured, each  
carrying out a unique workflow.



## Eclient

Client based desktop application that provides  
simple UI interface to the Engine API.  
Multiple Eclients can be used over a network  
to communicate with Engine, allowing job  
posting monitoring and ability to view reports.



# Engine Workflows

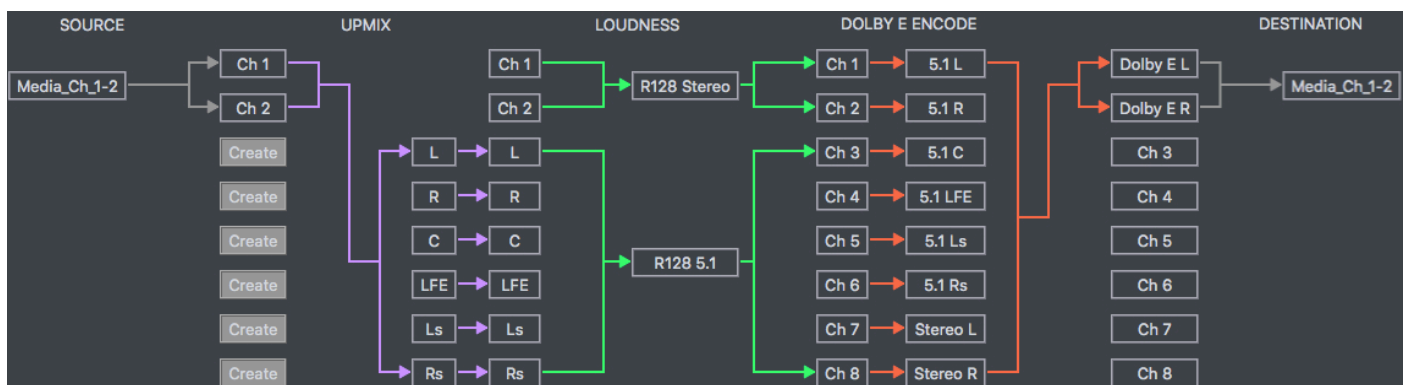
A frequent requirement for File-based workflows is to process audio to make it suitable for a wide range of delivery requirements. A series of audio processing operations are required and Engine allows creation of user defined workflows that define a sequence of operations (For example, Loudness Correction followed by Dolby® E Encoding and Channel Muting).

Engine has an easy to use UI that allows the creation and storage of workflows. These workflows can be used by MAM systems, Watch Folders and Eclient to allow a chosen file to be processed in accordance with the chosen workflow to create a new file. Particular attention has been paid to the design of the UI to quickly and easily allow creation, editing and naming of the workflows.

The UI allows the user to select audio channels (e.g. Stereo or 5.1), apply a process (e.g. Loudness), create or choose a preprogrammed profile for the process and repeat this for every unique Audio Program (so 4 Stereos could have 4 unique profiles). This operation is repeated for every required process to allow a sequence of operations (Loudness, Dolby® E Encode, Dolby® E Decode, Channel Mapping & Mute, Upmix, Downmix) that make up a workflow.

The workflow can be named and saved. The workflow can be previewed and edited at any stage of creation. Figure below shows an example workflow.

Any number of workflows can be created. These workflows can now be utilised by any of the Engine Operation modes: API, Watch Folder, Eclient and Manual Operation.



Example Workflow

# Signal Processing Modules

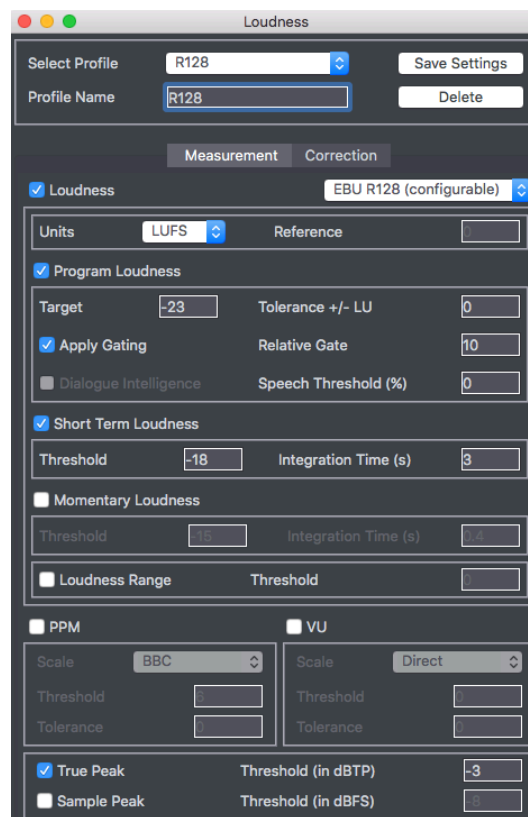
## Loudness

There is a global movement to adapt Program Loudness and True Peak correction. Engine allows the creation of file based workflows that deal with all the worldwide standards and can also Measure and Correct a wide range of Channel layouts (4 Stereos, Stereo + 5.1, etc...)

Engine supports up to 64 channels of audio. An optional module will also allow loudness correction of files with Dolby E encoded audio.

The Loudness Compliance algorithm used is designed to provide correction with minimal change to the creative mix. This is achieved by using global gain for Program Loudness and local processing for True Peak, Short Term and Momentary Loudness.

There is also an optional module to allow LRA correction.

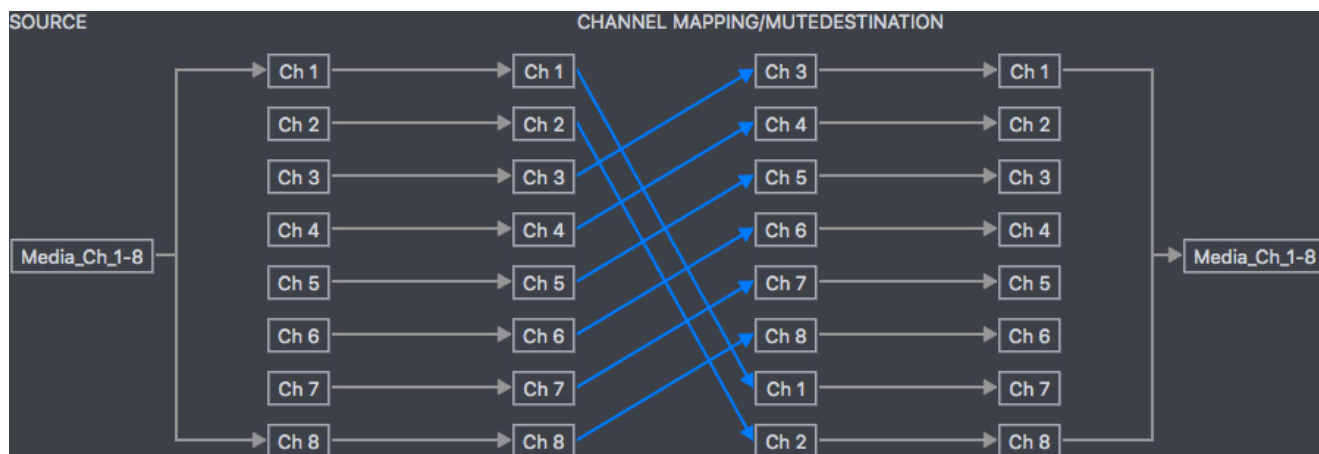


## Channel Mapping & Mute

Engine's Channel Mapping module allows remapping, replication and muting of selected audio channels.

Engine's workflow configurator lets you quickly and simply configure complex channel mapping tasks as shown in the diagram.

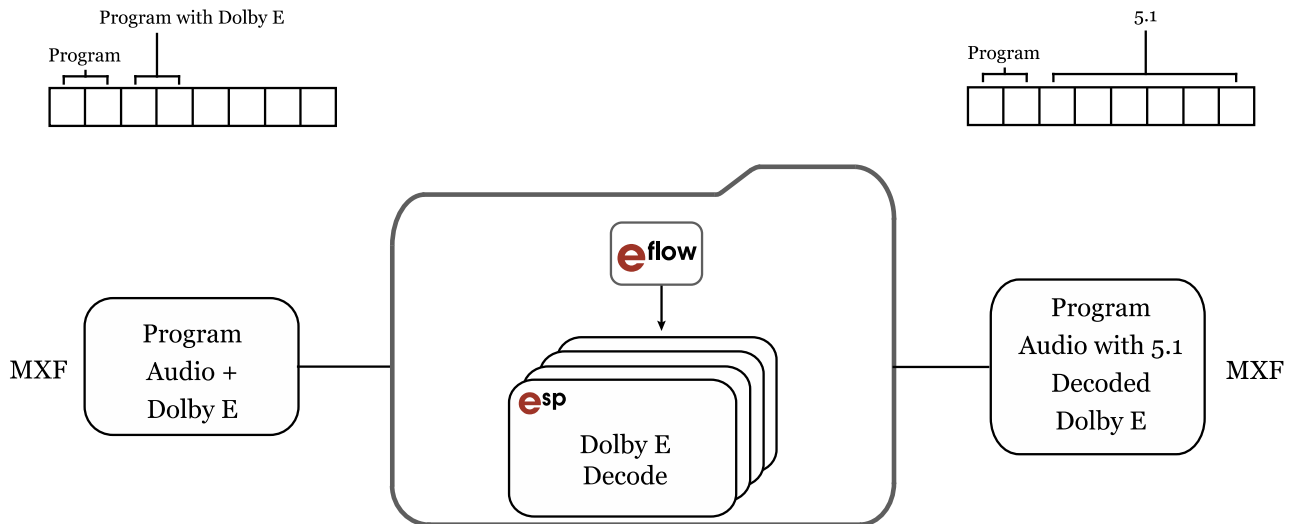
The example below remaps the stereo and the 5.1 in the audio to new locations.



# Signal Processing Modules

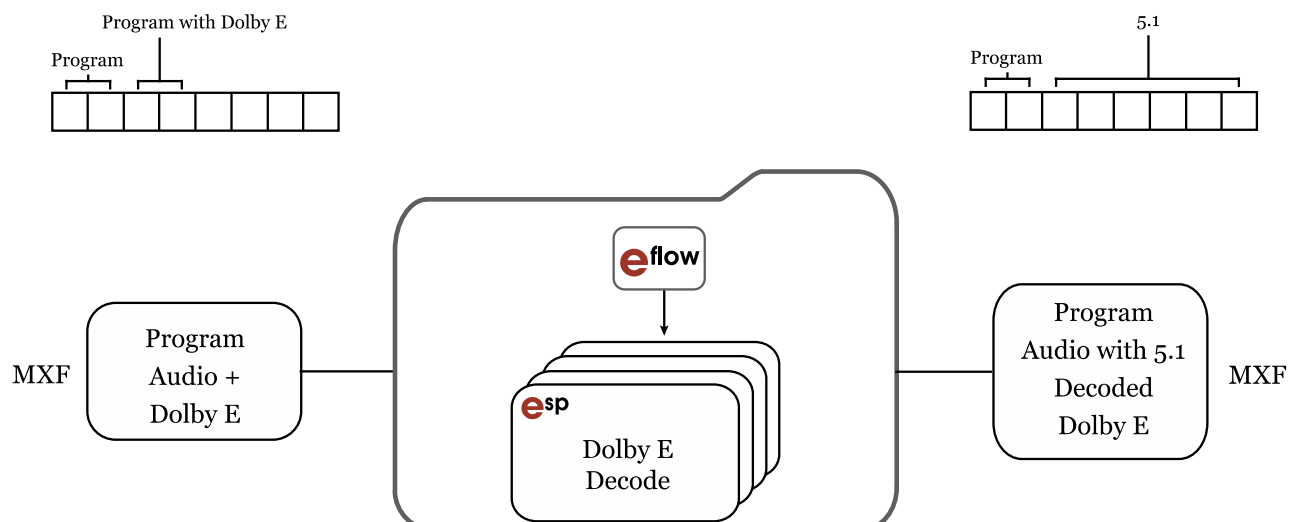
## Dolby E Encode

Dolby E encoding is in regular use by many Broadcasters. The Dolby E Encode module has been designed to simplify the complexity and operational difficulties associated with encoding the different program configurations and the management of metadata profiles. Additionally, the module allows positioning of the guard band and channel selection of where the encoded Dolby E is placed.



## Dolby E Decode

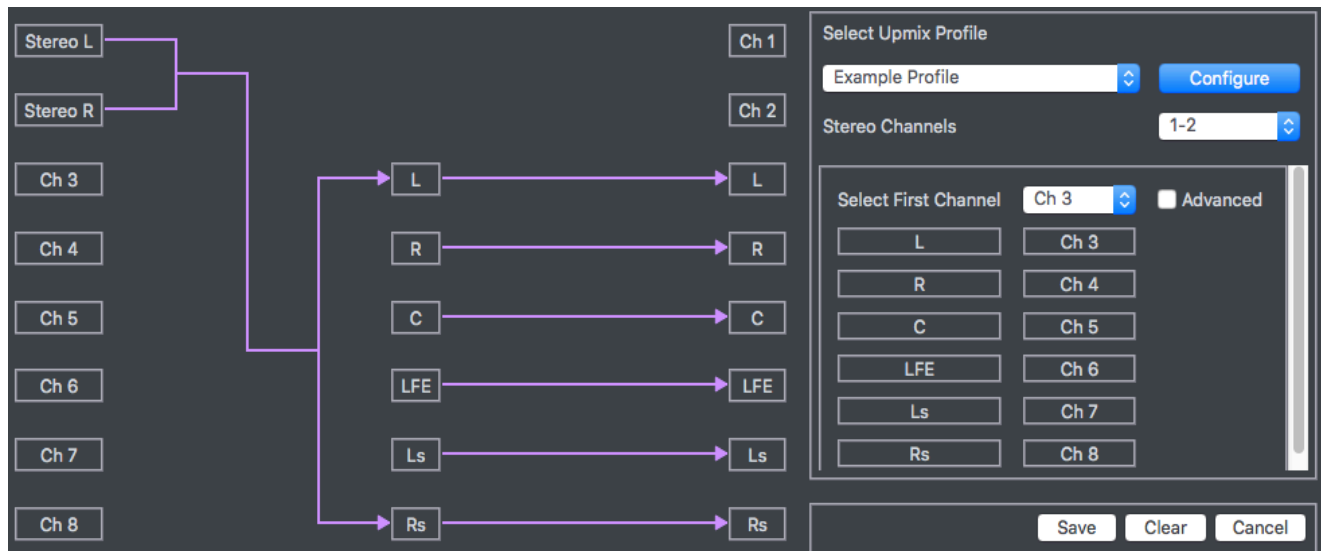
As with the Dolby E encoding, Dolby E decoding is regularly used by Broadcasters. Engine's Dolby E Decode module has been certified and has additional features that allow robust decoding from files that have a few frames of PCM at the beginning of the file and or misaligned guard bands.



# Signal Processing Modules

## Upmix

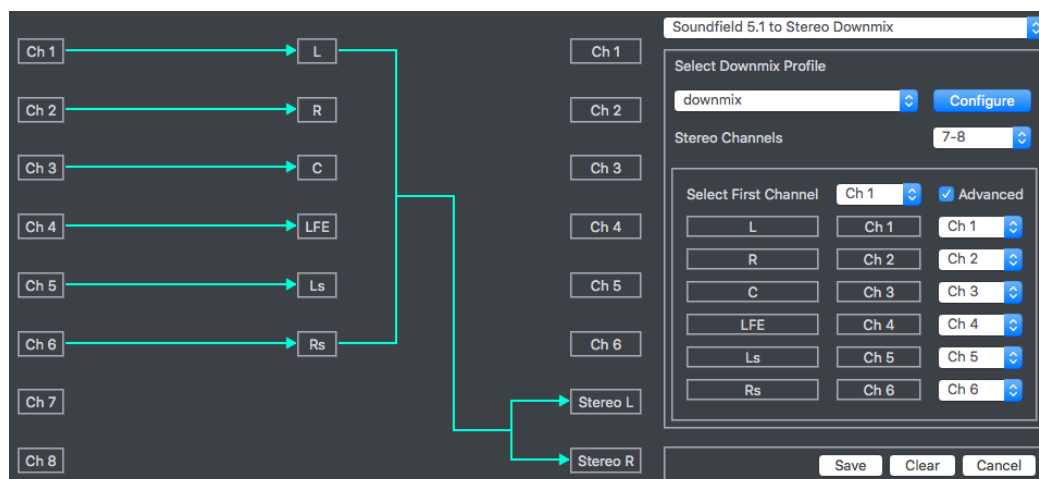
Broadcasters who multicast (SD and HD) or have archive material with a stereo mix have a frequent requirement to provide a high quality Upmix from stereo sources and vice versa. Emotion have teamed up with Soundfield to provide a high quality Upmix solution. Hardware solutions from Soundfield are already used globally by leading Broadcasters. The Upmix is downward compatible in proven solutions.



## Downmix

The Engine Downmix option can be used to easily convert a 5.1 file to stereo, and the stereo file further converted to mono.

Engine uses the SoundField Downmix algorithm which offers the standard Lo/Ro (Left only and Right only) and Lt/Rt (Left total and Right total) downmix options and includes some unique features such as adaptive EQ and independent direct and ambient downmix levels for the surround channels. The Downmix algorithm can be used as a reference to verify the quality of your stereo downmix in both Lo/Ro and Lt/Rt or as a high quality adaptive downmixer to create a separate stereo transmission feed.

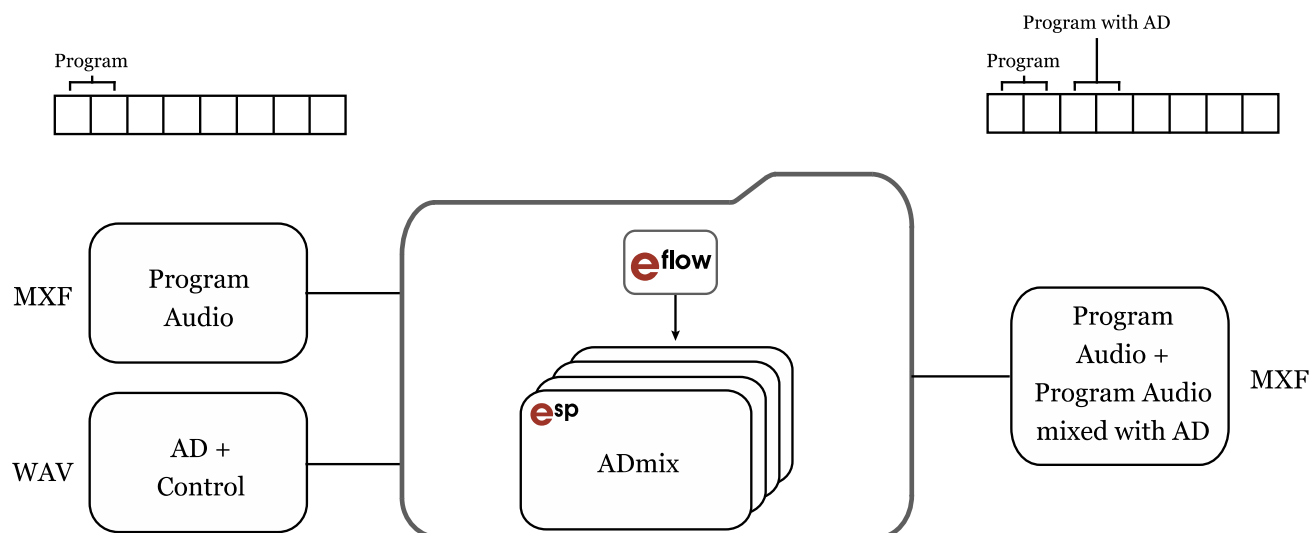


# Signal Processing Modules

## Audio Descriptor Example 1

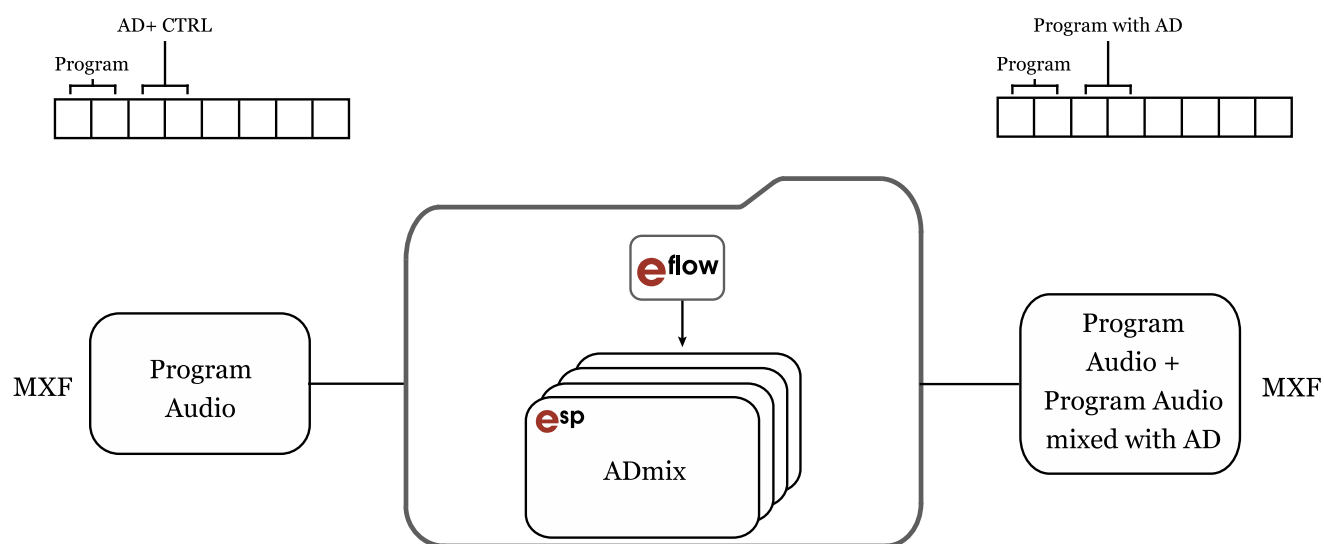
### MXF with program audio AD + Control from external WAV file:

The Audio Descriptor module takes Program Audio, Mono Audio descriptor Audio and uses the Control track to creates a new combined Audio Mix.



## Audio Descriptor Example 2:

MXF file has program audio as well as Audio Descriptor + Control.





# Signal Processing Modules

## Examine

The Examine module within **Engine** provides easy metadata extraction and reporting. Files with any number of audio channels may be processed and the metadata is reported in PDF or XML formats.

An example of the onscreen display is shown on the right.

If required, the complete AC3 metadata in Dolby E streams can be decoded and included in reports.

### Audio Information

Number Of Channels: 2  
Number Of Streams: 1  
Sample Rate: 48000 Hz  
Bits Per Sample: 24  
Audio Duration: 1417.60 seconds  
Audio Sample Groups: 68044800

### Stream Information

# 1: 2 channels  
Channel 1, Dolby E, LittleEndian  
Channel 2, Dolby E, LittleEndian

### Dolby E Information

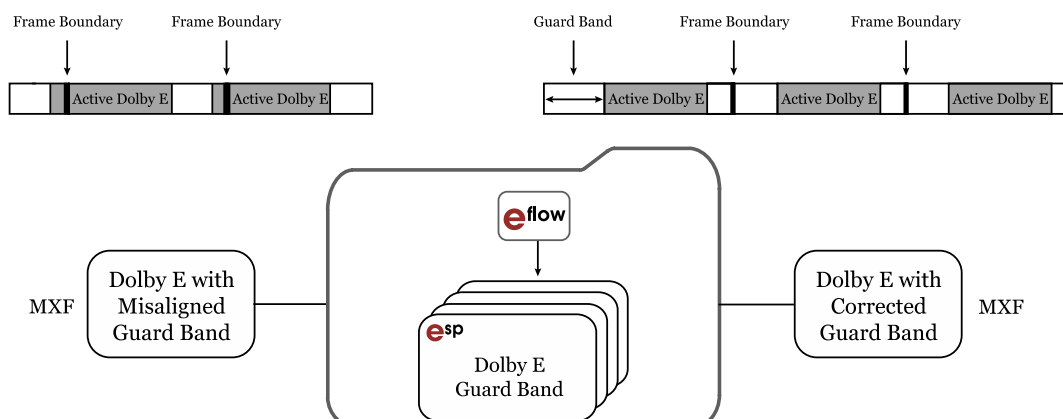
#Ch 1-2 Dolby E  
Program Configuration: 2 + 2  
Frame Rate: 25 fps  
Bit Depth: 16-bit  
Guard Band: 68 Samples  
Start timecode: N/A  
Offset: 15 Frames

## Dolby E Guard Band Correction

Dolby have a concept called the Guard Band position, and this refers to the delay from the start of the video frame, to the start of the Dolby E audio frame. For every different video format, Dolby have defined an 'ideal' start position for Dolby E data.

The Dolby E Guard Band Correction module measures the position of the Dolby E data within the frame structure and reports this. It can also be used to adjust the position to the ideal position.

In a real time environment, Dolby E audio encoding usually causes a one frame delay. The Guard Band correction module can be configured to move the Dolby E audio either forwards or backwards by up to two frames in case there is an issue caused by frame offsets.



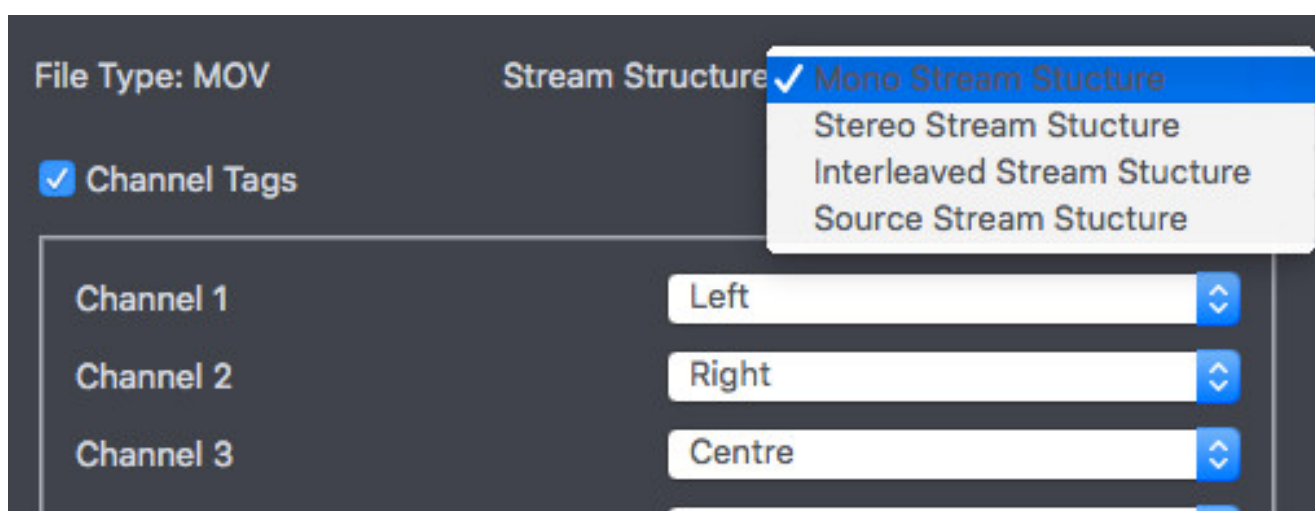
# Stream Manipulation Features

## Mono/Stereo/Interleaved streams metadata

Traditionally, SD MXF files contained 8 channels of audio in a single interleaved stream. HD MXF is most commonly created with mono streams, so a file containing a stereo and a 5.1 would contain 8 streams.

However, people are realising it is sometimes more helpful to merge channel groupings into streams. So a file containing stereo and 5.1 could be created as one stereo stream and one 6-channel interleaved stream.

Engine's stream manipulation module can convert from any input stream format to any output stream format for MXF & QT/MOV files.



File Type: MOV

Stream Structure

- ✓ Mono Stream Structure
- Stereo Stream Structure
- Interleaved Stream Structure
- Source Stream Structure

☒ Channel Tags

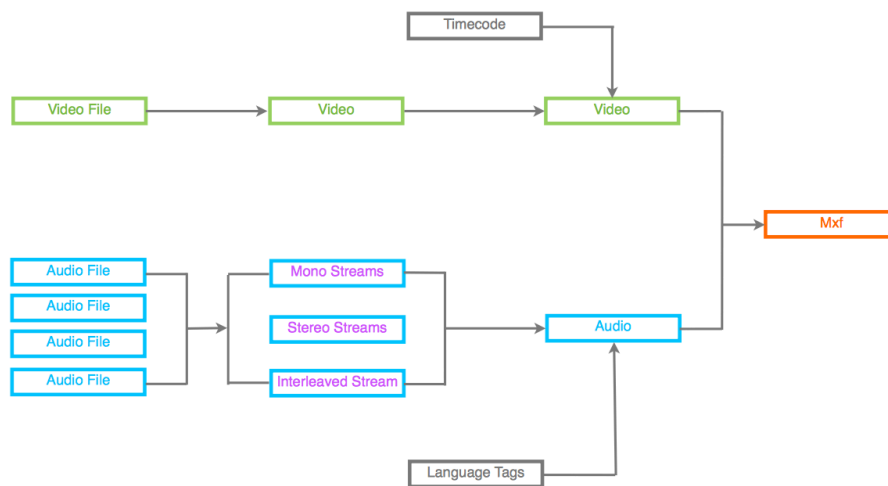
Channel 1	Left
Channel 2	Right
Channel 3	Centre

# Signal Processing Modules

## File Wrap and Language Tag

In a multilingual environment, there is often a single video essence file and multiple language versions of audio files stored as individual WAV files. This module allows the selection of the video file and the desired audio files to be wrapped into an MFX file and language tagged. The control over the operation uses a RESTful API.

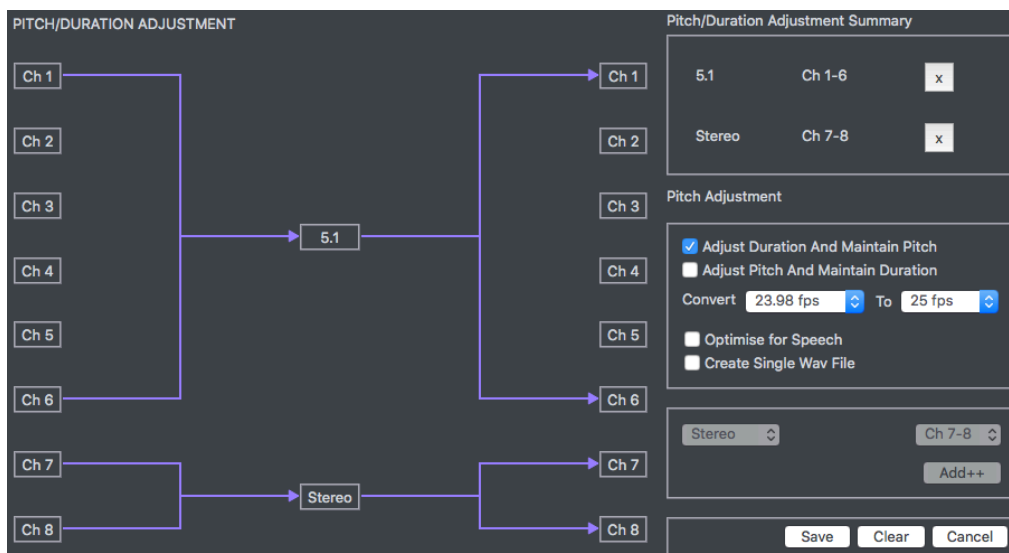
Audio And Video Multiplexing To Mxf



## Pitch & Duration Adjustment

When converting files from US to European formats and vice versa, it is increasingly common to restamp the frame rate metadata, as this is both quick and easy, but also avoids all the potential artefacts of full standards conversion.

However, the audio needs to be processed to fit the new duration, and that is the purpose of this high quality module.



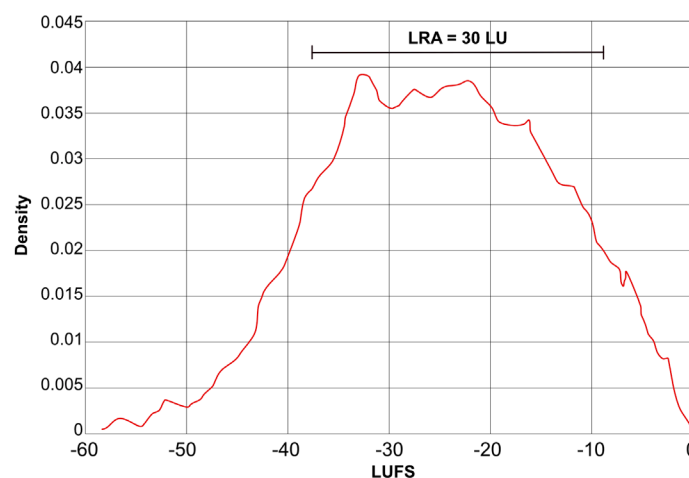
# Signal Processing Modules

## Loudness Range processor (LRA)

LRA is a parameter defined in the EBU Tech 3342 Loudness specification. Most applications have a flexible guideline as to the maximum permitted LRA. A few countries, and specifically Brazil, set an absolute maximum value for LRA.

Loudness range is a generic measure that helps to decide if Dynamic Compression is needed.

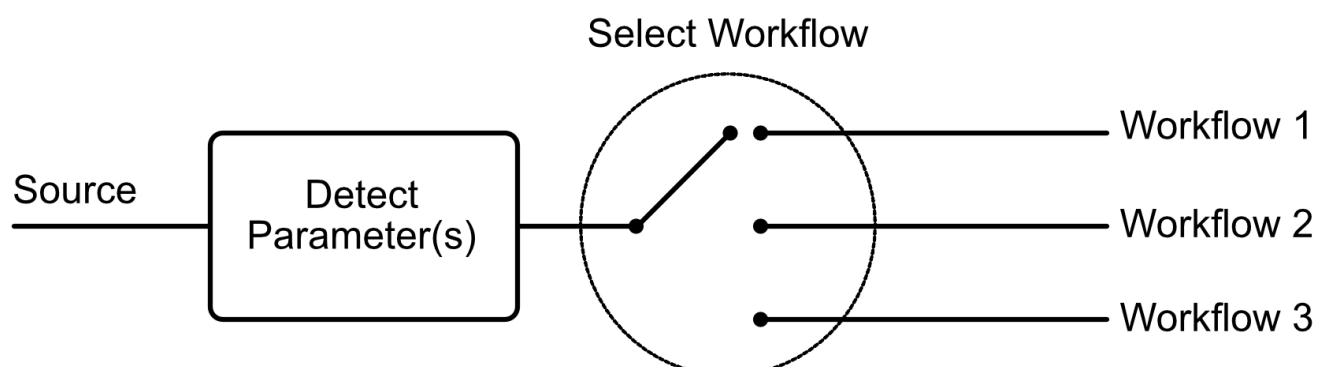
This option in the Loudness module, lets you specify the maximum LRA for the output file to meet the requirement. As a compression algorithm is used, this option should only be enabled when required, as compression in an automated environment will change the overall mix of the sound.



## Conditional Workflows

Standard Engine workflows are defined to work with media files containing a specific number of audio tracks. On detecting the number of channels in each source file, it is assigned the configured workflow automatically. Conditional workflows are compatible with media files containing between 1 and 64 audio channels.

Different standard workflows can also be selected based upon whether configured channels in the source file contain Dolby E. Hence you could have one process carried out if channels 3 & 4 contain PCM and a different process carried out if the channels 3 & 4 contain Dolby E.



# Engine Order Options

Engine comes as standard with Eflow and 4 Watch Folders – which is a costed item.

1. Decide which ESP options are required for the workflow
2. Decide how many instances you want to have running simultaneously
3. Multiply the ESP options by the number of instances to calculate the cost of ESPs
4. Support is chargeable at 15% of the total value of the order

## Engine Order Guide

### ESP Modules:-

Loudness  
Dolby E Decode  
Dolby E Encode  
Dolby E Guard Band Correction  
Upmix  
Downmix  
Audio Descriptor  
Channel Mapping & Mute  
Channel Replace and Extract  
Examine  
Add and Remove Channels  
File Wrap and Language Tag  
Stream Manipulation  
LRA Processor  
Conditional Workflows  
Pitch Adjustment

Please tick

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Quantity

**Number of instances**  
**Eclient (1 as standard)**  
**Number of additional Eclients**

<input type="text"/>
1
<input type="text"/>

Please tick

**Eflow + 4 Watch Folders (as Standard)**  
**28 Additional Watch Folders**

<input checked="" type="checkbox"/>
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## Contact Information

Address:- Astor House, Newbury Business Park, Newbury, Berkshire, RG14 2PZ, UK  
Email:- sales@emotion-systems.com  
Telephone:- +44 1635 522 786

